Cal/EPA EJ Action Plan Pilot Projects
Addressing Cumulative Impacts and Precautionary Approach
March 25, 2005

In 2004, Cal/EPA developed the Intra-agency Environmental Justice Strategy (EJ Strategy) and the EJ Action Plan, that jointly form the "Two-Pathway Approach" to achieve environmental justice. The EJ Strategy is the product of a multi-year collaboration between the Cal/EPA Interagency Working Group on Environmental Justice (IWG), the Cal/EPA Advisory Committee on Environmental Justice (CEJAC), and EJ stakeholders (including community, local government, business, industry, and tribal representatives). It sets forth the Cal/EPA's EJ vision, mission, core values, goals, and objectives that will guide the Agency's boards, departments, and office (BDOs) in integrating environmental justice into their programs, policies, and activities. In addition, it provides the foundation for addressing EJ issues and would be revised as necessary in view of evolving environmental justice issues, programs, policies, and activities.

Complementing the EJ Strategy, the EJ Action Plan specifies a set of short-term, community-oriented projects. In its February 16, 2005 meeting, in consideration of the recommendations from CEJAC, the IWG adopted the following working definitions to guide the pilot projects:

> **Cumulative Impacts** means exposures, public health or environmental effects from the combined emissions and discharges in a geographic area including environmental pollution from all sources, whether single or multi-media, routinely, accidentally or otherwise released. Impacts will take into account sensitive populations and socioeconomic factors where applicable and to the extent data are available.
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> **Precautionary Approach** means taking anticipatory action to protect public health or the environment if a reasonable threat of serious harm exists based upon the best available science and other relevant information even if absolute and undisputed scientific evidence is not available to assess the exact nature and extent of the risk.

Some of the pilot projects have been initiated to serve as the primary mechanism for exploring the complexity of cumulative impacts and precautionary approaches. One project will focus in enhancing public participation and empowering community capacity. Another project is aimed at developing a cost effective approach for reducing levels of contamination where illegal drug have been produced.

The pilot projects will collect environmental emissions/discharge, exposure, and health risk data; and identify data gaps at the community level. As part of the study design, the working definitions of cumulative impacts and precautionary approach will be applied to the extent feasible in applicable situations.

Cal/EPA's BDOs will also take the necessary steps to promote meaningful participation by the EJ stakeholders in all phases of the pilot projects. BDOs will consider CEJAC's and Local Advisory Groups' recommendations and modify the scope of the project, if necessary. CEJAC will also assist in providing input and recommendations from a regional and statewide perspective for the pilot projects.

It is envisioned the results from these projects will assist in developing a common approach that can be followed by BDOs in:

a. Assessment of cumulative impacts,
b. Application of precautionary approaches,
c. Standardized protocol for public participation, and
d. A list of actions to increase community capacity in decision-making process.

The following pages provide the summaries of each pilot project.

Cal/EPA Environmental Justice Action Plan

Pilot Project Summary for
Air Monitoring in a Central Valley Community

March 25, 2005

I. **Lead Agency**: Department of Pesticide Regulation (DPR)

II. **Project Area:** The community of Parlier, Fresno County.

Area Demographics: See information below on Page 2, under "Site Selection." For a more detailed examination of the demographics of Parlier and other communities considered for this project, please refer to the briefing paper on DPR's Environmental Justice Web site, www.cdpr.ca.gov/docs/envjust/pilot_proj/index.htm

III. **Background:** California rural communities may have higher concentrations of pesticides in ambient air compared to urban communities, due to their proximity to agricultural fields. Air monitoring conducted by the DPR and the Air Resources Board (ARB) currently provides limited data to estimate human exposure to both single and multiple pesticides over several months or years.

This project will focus on monitoring ambient air concentrations of 21 to 27 pesticides. The data gathered will help us evaluate ambient air exposure to pesticides in order to better understand and identify opportunities to reduce environmental health risk, particularly to children. (For more details on the pilot project, see the summary and background at www.cdpr.ca.gov/docs/envjust//pilot_proj/index.htm.)

DPR will also explore ways to assess cumulative risks and to apply precautionary approaches, using the working definitions adopted by the Interagency Working Group in February 2005. This effort will be an iterative one, as it parallels similar efforts by the other pilot projects, and will be affected by ongoing refinement of the definitions by the Office of Environmental Health Hazard Assessment (which has the lead for the cumulative impacts definition), and the Integrated Waste Management Board (lead for precautionary approach).

The pilot project will collect cumulative impact data and, to the extent possible, assess cumulative impacts from exposure to pesticides in other media and to other environmental contaminants. DPR will also take advantage of this pilot project to explore concepts and develop tools to incorporate the precautionary approach.

IV. **Project Start Date:** Spring 2005

V. **Project End Date:** Summer 2006 (data collection ends); early 2007 (release of evaluative report)

VI. Goal & Objectives:

a. Goal: Evaluate ambient air exposure to pesticides in order to better understand and identify opportunities to reduce environmental health risk, particularly to children.

b. Objectives:

- Are residents of the community exposed to pesticides in the air?
- Which pesticides are people exposed to and in what amounts?
- Do measured pesticide air levels exceed levels of concern to human health, particularly children?

VII. Activities – Planning, Implementation, Evaluation, & Deliverables

Planning

- **Site Selection**: DPR evaluated 83 communities, 81 of them in Merced, Madera, Fresno, Kings, and Tulare counties. One community from Kern County and one community from Stanislaus County were also evaluated. Prioritization of the communities was based on the following criteria:
  - Community Environmental Justice (EJ) Factors
    - Child population (less than 18 years old)
    - Non-white population
    - Family income
    - Pesticide drift illnesses
  - Availability of Cumulative Impact Data
    - Pesticide well monitoring
    - Monitoring stations for criteria air pollutants
  - Pesticide Use
    - Regional use (within 5 miles of community) of four different categories of pesticides
    - Local use (within 1 mile of community) of four different categories of pesticides

*For a detailed briefing paper on the selection factors and relative weightings of the 83 communities, please refer to DPR's Environmental Justice Web site, www.cdpr.ca.gov/docs/envjust/pilot_proj/index.htm.

DPR also considered other factors, including air sampling feasibility, weather patterns, and the potential for collaboration with other projects focused on environmental health.

Site selection factors of Parlier are significant. Parlier has a high rating on most environmental justice factors noted above, with the exception of drift illnesses. The

community has high use of most pesticides. There is a large amount of cumulative impact data available for Parlier, and collaborative opportunities for Parlier are good. Parlier is a candidate for an upcoming asthma study planned by the University of California at San Francisco (UC San Francisco); and the University of California Kearney Agricultural Center, located just outside Parlier, is conducting research and extension programs to help growers use farming practices that are economically, environmentally and socially sustainable.

Based on these factors, DPR selected the City of Parlier in Fresno County, the highest rated community of the 83 communities evaluated for the pilot project and in part on the availability of additional monitoring data for the community.

Candidate Pesticides to Monitor: DPR proposes to monitor from 21 to 27 pesticides. Candidate pesticides were selected based on the following criteria:

- Statewide use
- Volatility
- DPR risk assessment priority
- Valid monitoring method

For a detailed briefing paper on the selection factors and candidate pesticides, please see DPR's Environmental Justice Web site www.cdpr.ca.gov/docs/envjust/pilot_proj/index.htm.

- **Reduction of Risk to Children's Health:** Additional data on pesticides in ambient air can help provide the foundation for more robust exposure assessment. Exposure assessments, along with other data, are needed to develop effective measures, as necessary, to reduce any hazardous pesticide levels in air.

- **Cal/EPA Cross-Media Implication:** DPR considered the availability of data of pesticides in groundwater and on other air toxins (including criteria air pollutants. Parlier was selected for monitoring based in part on availability of additional monitoring data for the community. Available data include:

  - Pesticide concentrations in drinking water wells.
  - Air concentrations of the criteria air pollutants ozone, carbon monoxide, and nitrogen dioxide.
  - Air concentrations of volatile organic compounds, including the fumigants methyl bromide and 1,3-dichloropropene.
  - Air concentrations of metals and elements, including the pesticides sulfur and copper.

  (These data originally included air monitoring for dioxins. However, the Air Resources Board plans to move the air sampler located in Parlier to a different community.)

- **Partnerships:** Parlier offers great potential for collaborative projects, including:

- **UC San Francisco Valley Air Pollution Health Effects Research Institute** in Fresno plans to study correlations between asthma in children and air toxics, including pesticides. This study will examine asthma prevalence and air concentrations at two urban and two rural schools. The schools have not been selected, but it is likely that the schools selected will be located in Fresno County.

- The **California Environmental Health Tracking Program** (joint program of the Centers for Disease Control and Prevention, California Department of Health Services, and Cal/EPA's Office of Environmental Health Hazard Assessment) is conducting a pilot project in the San Joaquin Valley to demonstrate the feasibility of linking exposure (including pesticides) and health outcomes data. This project will also evaluate potential relationships between exposure and health outcomes.

- The **University of California Kearney Agricultural Center**'s research and extension programs are designed to help farmers achieve economic success while farming using environmentally and socially sustainable practices. The possibility of consultation with scientists at Kearney would be beneficial not only during the air monitoring portion but more importantly, during any mitigation development phase of the project**.**

In addition, other monitoring data may be available. DPR will consult with the following agencies regarding environmental and health data for Parlier:

- Department of Toxic Substances Control (DTSC)
- California Integrated Waste Management Board (CIWMB)
- California Office of Environmental Health Hazard Assessment (OEHHA)
- California State University, Fresno
- Fresno County Health Department
- San Joaquin Valley Air Pollution Control District
- State Water Resources Control Board
- U.S. Environmental Protection Agency

Implementation

- **Methodology & Performance Indicators:** DPR will collect and analyze air samples a maximum of 27 pesticides. Monitoring will likely occur at two to four sites in Parlier, sampled four to twelve times per month, for 12 months. The monitoring data will be evaluated to determine which, if any, of the pesticides exceed health screening levels[1] established by DPR scientists. This evaluation will also include estimates of cumulative risk from multiple pesticides and multiple media.

  Data Collection: Enforceable state or federal health standards have not been established for most pesticides in air. In these types of projects, DPR typically uses health screening levels to evaluate the possible health effects of exposure to a chemical. DPR will establish screening levels for the pesticide active ingredients before beginning air monitoring for them. A detection below the screening level would not be considered to represent a significant health concern and would not generally undergo further evaluation, but also should not automatically be considered "safe." By the same token, a concentration above the screening level would not necessarily indicate a significant health concern, but would indicate the need for a further and more refined evaluation.

  If, during the data collection phase of the pilot project, DPR identifies air levels of pesticides that substantially exceed screening levels, we will work with the County Agricultural Commissioner's office to determine what applications of the subject pesticides have occurred in the vicinity of Parlier, how the pesticides were applied, and whether measures can be taken to reduce air levels. These actions can be taken based on monitoring and other data, in the absence of adverse health effects.

  DPR will also compile available data on socioeconomic and other factors that may affect exposure and risk to environmental contaminants. DPR will compile data for Parlier from the U.S. Census, such as ethnicity, age, income, education, and health insurance. DPR will collaborate with the California Environmental Health Tracking Program (a DHS project) in compiling data on disease incidence and environmental contaminants. DPR will also collaborate with the University of California (UC), San Francisco's Valley Air Pollution and Health Effect Research Institute on its study of asthma and air toxics.

- **Public Participation:** Monitoring data should be collected over an entire year to provide the most complete representation of pesticides in ambient air (many orchard pesticides are applied during the dormant season. In addition, before planting, soil is often fumigated, and this typically occurs in winter or early spring). DPR plans to move quickly to establish a

[1] Screening levels are established from toxicological data using scientifically accepted, health-protective assumptions. These include the application of factors to address areas of uncertainty, such as extrapolating from animal data to humans and the possibly increased sensitivity of children. Different exposure time periods will have different screening levels. Various data are used as the basis for these screening levels, including published U.S EPA risk assessments and completed DPR risk assessments. These health screening levels are not legal health standards and should not be viewed as such. The screening levels represent the first tier in a risk evaluation and provide a context in which to view measured levels of the pesticides.

local advisory group (LAG). The LAG will provide recommendations and input to the DPR staff involved in the pilot project. Staff from the Department of Toxic Substances Control (DTSC) public participation program will assist in the development of the LAG and facilitate communication between the LAG and DPR staff, as necessary. The LAG will provide the diversity of viewpoints and balance of representation of the project community, including members of community groups, local agencies, business interests, and other stakeholders, with focus from the project community representatives. DPR also plans to include a local heath practitioner with knowledge of disease patterns in Parlier in the project's Local Advisory Group to review the data collection efforts

- **Project Work Plan & Timeline:**

	Activity	Start Date	End Date
Phase 1	**1. Identify pilot project location(s)**	**1st Qtr 2005**	**1st Qtr 2005**
	2. Define project parameters	**1st Qtr 2005**	**1st Qtr 2005**
Phase 2	**1. Establish Local Advisory Group (LAG)**	**2nd Qtr 2005**	**Ongoing**
	2. Collect data	**2nd Qtr 2005**	**2nd Qtr 2006**
	3. Evaluate results and write report	**3rd Qtr 2006**	**1st Qtr 2007**
Phase 3	**1. Develop Children's Environmental Risk Reduction Plan (ChERRP)**	**1st Qtr 2007**	**2nd Qtr 2007**
Phase 4	**1. Implement ChERRP**	**3rd Qtr 2007**	**1st Qtr 2008**
Phase 5	**1. Evaluate ChERRP**	**Ongoing**	**3rd Qtr 2008**
	2. Explore implementation options of project	**Ongoing**	**Ongoing**

Evaluation & Deliverables

- **Data Evaluation:** DPR will take a variety of approaches to assessing the cumulative impact of pesticides and other pollutants, and to seeking ways to adopt the precautionary approach in the pilot project.

  DPR will evaluate the pesticide monitoring data using standard risk assessment methods. DPR will evaluate data for potential health risks from exposure to individual pesticides as well as to multiple pesticides (cumulative risk), exploring various approaches to evaluating the risk from multiple pesticides.

  One possible approach -- using the hazard quotient and hazard index -- was used by DPR in a previous air monitoring project in Lompoc (Santa Barbara County). In the Lompoc

project, DPR scientists first calculated the risk for each individual pesticide as a hazard quotient:

$$\frac{\text{Air concentration}}{\text{Screening level}} = \text{Hazard quotient}$$

A hazard quotient is the air concentration detected expressed as the percentage of the screening level. For example, if the air concentration were 25 percent of the screening level, then the hazard quotient would be 0.25. When the hazard quotient is greater than one, the air concentration would exceed the screening level and further analysis of the data would be required.

Pesticides may exhibit toxic effects independently, or they may interact in an additive, synergistic, or antagonistic manner. In Lompoc, the approach taken was to calculate risk from multiple pesticides by adding all of the hazard quotients for the individual pesticides:

$$\begin{aligned}\text{Hazard Index} = {} & \text{Hazard Quotient of Pesticide 1} \\ & + \text{Hazard Quotient of Pesticide 2} \\ & + \text{Hazard Quotient of Pesticide 3 … (and so forth)}\end{aligned}$$

This approach assumes that toxicity and risk of all monitored pesticides are additive, although only a subset of the monitored pesticides (including organophosphate insecticides and oxygen analog breakdown products toxic to the nervous system) are known to act in an additive manner. Since the Lompoc project, U.S. EPA has developed more refined methods for analyzing cumulative impacts of pesticides, and these, the hazard quotient approach, and other avenues will be explored.

Should levels of pesticides be found above screening levels, it can trigger additional data collection and evaluation, in Parlier and elsewhere. The data helps DPR to evaluate the geographic scope, timing and use factors that contributed to the air concentrations. These and other data can establish parameters of problematic residues. The data are necessary to develop effective measures to minimize or eliminate unacceptable air exposures, and are required by law to support regulatory action.

- **Results:** The monitoring results will be evaluated to determine the exposure and risk from individual as well as multiple pesticides. The data will be compared to historical monitoring results from other areas. DPR will also evaluate the results and pesticide use patterns at the time of monitoring to determine possible mitigation measures, as well as other potential areas and time periods for future monitoring. DPR is developing sampling and laboratory methods that provide flexibility so that they can be used in other areas with minimal additional work.

  With assistance from the Air Resources Board, DPR will also compare air concentrations of criteria pollutants, volatile organic compounds, and metals in Parlier with other areas

of the state and determine if Parlier has elevated levels of these pollutants. In addition, DPR will collaborate with the Office of Environmental Health Hazard Assessment, the Department of Health Services, and UC San Francisco in analyzing the data and determining if there are any correlations between pesticides or other environmental contaminants and disease incidence.

In situations where ambient air levels of pesticides lead to exposures of regulatory concern, DPR determines opportunities to change pesticide use practices to reduce ambient air concentrations. The opportunities to change pesticide use practices range from regulatory restrictions on the use of certain pesticides to seeking grant monies to promote alternative pest management strategies. While the focus of these efforts may be derived from the results of air monitoring, if other datasets evaluated by DPR (for example, groundwater pesticides data) demonstrate the need for further action, DPR addresses these also.

This project presents a number of opportunities for exploring a precautionary approach. The type of actions DPR may take to change pesticide use practices can include:

- A risk reduction approach could be focused on local and state enforcement efforts on eliminating illegal pesticide application practices that result in problematic levels of pesticides in air.

- Training pesticide applicators on best management practices (BMPs) can also be expanded. (BMPs are management and cultural activities and practices, general good housekeeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices or devices, or prohibitions of practices, to prevent or minimize harm to health and the environment. These practices are defined by research and field testing to be the most effective and practicable methods.)

- DPR can also work with the registrant and the U.S. Environmental Protection Agency to make improvements to the pesticide product label. Among other elements, the label includes instructions and restrictions on product use. (Under federal law, states are precluded from mandating changes in pesticide labels.)

- Collaborative efforts can be pursued with UC Cooperative Extension on education for growers on pest management alternatives. Evaluating and promoting the use of alternatives is a key element of precaution.

- DPR may seek grant monies to support projects on pest management alternatives.

These and other risk reduction measures can be used singly or in combination.

It should be noted that in addition to the measures outlined above--which are taken after a pesticide is in use in California—additional precautionary steps are taken before a pesticide can be sold or used in California. Before obtaining registration for a pesticide product, manufacturers must generate and submit health and environmental data to DPR for evaluation. The decisions that DPR makes about which pesticides to allow into the marketplace and under what conditions are based on cautious assumptions designed to protect human health and the environment from unacceptable impacts. When a product is registered, legally binding limitations are placed through product labeling on where, when and how the product can be used. The nature of this pre-registration evaluation is the basis for state laws that require the Department to have substantial data to cancel or modify the use of a pesticide.

- **Deliverables:** Deliverables include the following:
  - More robust exposure assessment data.
  - Indicators for future air monitoring projects.
  - Indicators for areas for future investigation.
  - Data that can be used to develop risk reduction measures that may be needed.

- **Considerations, Anticipated Challenges/Constraints:** Data collected may be ambiguous, or present an incomplete picture. Even if evaluation results are clear, solutions may not be. For example, air monitoring data collected in the early 1990s indicated problematic ambient air levels of the fumigant 1,3-D. Revised application practices were needed to reduce levels in air. The registrant (manufacturer) undertook several years of field testing to develop these measures. Similarly, water quality analysis has demonstrated problematic levels of the organophosphate pesticides diazinon and chlorpyrifos in surface water. However, further studies were needed to determine the source of the residues and to develop effective measures to control the problem. Related to these examples is the continuing challenge inherent in pesticide use: many pesticides are used only at certain times of the year, so monitoring and field testing of mitigation measures is limited to those, sometimes brief periods.

VIII. For More Information:

For more detailed discussion of the criteria used and relative rankings of the evaluated communities, please visit DPR's Environmental Justice Web page at **www.cdpr.ca.gov/docs/envjust/pilot_proj/index.htm**.

Comments, Questions, or Concerns regarding this Pilot?

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